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How has India's Rapidly Growing ICT Sector Impacted its Rural Poor?

Jasmine Bartolome
Portland State University

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by

Jasmine Bartolome

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Abstract
In this analysis I examine India's most thriving sector, information and communication technology (ICT). Over the past two decades, India's ICT sector has grown at a rapid rate compared to world standards and has become their specialized area of economic interest. Employment in this sector generally requires highly skilled, educated, English-speaking workers. The majority of India's population live in rural areas, with little to no access to education; thus, they have major boundaries to participating in India's booming growth.

I inquire into the relationship and correlation between the Indian ICT sector and the socioeconomic livelihood of rural citizens, as measured by poverty level. Through generalization of current literature and linear regression analysis of primary data sources from the Indian government, I conclude that ICT has the potential to greatly benefit the rural impoverished, but it unfortunately remains untapped. As a result, increasing ICT specialization continues to leave the rural behind.

Key Words: India, ICT, Poverty, Specialization

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Section 1

I. Introduction

Over the past two decades, India's information and communication technology industry (ICT) has been among the fastest growing in the world. From 2000 to 2004, the Indian economy grew at a staggering rate of 6.2 per cent, and has since grown at an average annual rate of 8 per cent (Dahlman 2007), becoming "the world's leading exporter of software services" (Gregory, Nollen, and Tenev 2009). Developed countries exhibit this growth but lag behind India, still a developing country, in job creation. The 2013 Global Information Technology Report cited 1,117,753 jobs created in South Asia by digitization with India responsible for the larger portion of that. However, these substantial monetary and job growth numbers do not necessarily correlate to improvements in socioeconomic wellbeing in India.

Table 1: Digitization's impact on GDP and jobs, 2011

	Regional impact	
Region	GDP impact (US$ billions)	Number of jobs created
Africa	8.3	618,699
Commonwealth of Independent States	11.8	340,820
East Asia and the Pacific	55.8	2,370,241
Eastern Europe	7.0	159,015
Latin America and the Caribbean	27.0	636,737
Middle East and North Africa	16.5	377,772
North America	25.3	167,650
South Asia	9.4	1,117,753
Western Europe	31.5	213,578
Total	192.6	6,002,266

Source: 2013 Global Information Technology Report

This paper attempts to answer the question, how has India's rapidly growing ICT sector impacted its rural poor? I hypothesize that as India increases specialization in ICT, its rural poor are left behind on a socioeconomic level due to human capital and job opportunity limitations. Those living in poverty and extreme poverty with little to no access to education are left behind because India has shifted focus away from the primary sector, agriculture and manufacturing. The implication of being left behind is these families are unemployable by the most thriving

sector in their country; thus, they lack income (a means to sustaining a livelihood) so their living standards deteriorate.

The question I pose is both timely and relevant as research into the socioeconomic impact of India's booming growth has just began in the past few years. My analysis of primary data sources on poverty and ICT is among the first of its kind and could provide a broader state-wise and country-wide understanding of how ICT has impacted the rural poor. Increasing this understanding could inform future actions in balancing economic growth and socioeconomic impact awareness.

In their research, Eichengreen and Gupta (2011) found "the vast majority of Indian labor is moving into the modern sector and that modern services are a viable destination only for the highly-skilled few." Employment in this sector typically requires a college education and English as a second language. Those who do have access to education and have learned English are reaping the benefits in the middle and upper classes which are concentrated in urban areas (Upadhya 2007). Thus, there is an increasing imbalance in job opportunities and human capital demand.

According to the 2011 Indian Census (Mehta 2013), sixty-nine percent of India's population lives in rural areas; meaning, the majority of India functions with substantial barriers to education attainment and social mobility, and work in an unorganized, casual labor market which yields very little income. The rural population is at an inherent disadvantage in India as they lack the pre-requisites to participating in their country's economic growth in the tertiary, modern services sector. The rural populations are mainly capable of working in the primary and secondary sectors, which largely consists of agriculture and manufacturing.

Undeveloped economies are typically driven by their primary and secondary sectors as they gradually build up towards the tertiary, high-skill demanding sector. It seems, for the most part, India has skipped this intermediary step of emphasis on manufacturing before modernization resulting in a failure to give the unskilled and uneducated a chance to learn and adapt over time. Eichengreen and Gupta (2011) confirm that "it is no longer obvious therefore that manufacturing is the main destination… we conclude that sustaining economic growth and raising living standards will require shifting labor into both manufacturing and services." India's quick shift after the 1990 reforms into specializing in ICT has excluded the uneducated and unskilled.

Apart from Eichengreen's proposal that India shift labor into both manufacturing and services to sustain growth, another long-term solution would be educational intervention - entering the poverty-stricken areas and creating infrastructure for primary and secondary schools. In addition, more forms of employment for unskilled workers must be created. There are programs and projects in place that are attempting to do these things, but they have yet to gain substantial success.

The paper is organized in four sections. Following the introduction, the next subsection provides an overview of ICT's role in rural India through case studies in existing literature. In Section 2, ICT and my methodologies are defined. Section 3 presents the data findings and statistical analysis. Lastly, I conclude in Section 4.

II. Context and Current Literature

Much of the research on this subject revolves around India's growing services sector in fiscal terms and its proportion of the world industry. These sorts of inquiries are much more frequent than those of the socioeconomic impacts of this growth which I've sought out.

Despite growing concern, there remains a relatively small amount of literature available on the socioeconomic impacts of the ICT sector. It's apparent that a main inhibitor to socioeconomic inquiries is a significant lack of necessary and relevant data. Accurate, representative, and all-inclusive data collection activities have only begun to kick off in recent years. As a result, the current literature features quite narrow representations and studies of the impacts of ICT on rural populations. Existing literature has been useful by providing specific case studies of ICT dissemination in India. From these smaller studies, I can derive some useful, albeit limited, conclusions. There is hope for the near future though, as collection methods in India are increasing in quality and abundance.

To begin, India's ICT industry is comprised of software industry and information technology-enabled services (ITES), including the business process outsourcing (BPO) industry. ITES/BPO involve offshoring for financial and administration processes, human resource functions, call center and customer service activities and accounting and payroll – using "some form of automation," hence the IT characterization (sourcingmag.com 2014). Finding useful, time-wise data on this industry has proven difficult for many researchers.

India's government Ministry of Statistics and Program Implementation (MOSPI) recently agreed to run the project on "Statistical Compilation of ICT Sector and Policy Analysis"("ICT Sector Statistics in India - Current Status" 2013). The MOSPI also runs the National Sample Survey Office (NSSO) which surveys the socioeconomic status of India's population. These are ongoing efforts to improve data availability and integrity.

The literature I gathered is meant to inform my hypothesis, so I will restate it here: I hypothesize that as India increases specialization in ICT, its rural poor are left behind on a socioeconomic level due to human capital and job opportunity limitations. I will discuss the

ways in which the available literature informs both sides of my hypothesis. There are a number of featured instances in which India's growing ICT industry has benefited rural populations, but the overarching theme seems to be that this industry is indirectly hurting this population more than it's helping.

In the 2005 article "ICT and Rural Societies: Opportunities for Growth," Mathur and Ambani provide examples of efforts to create a more inclusive ICT industry to help the rural, unskilled population. However, these efforts are in their infancy which have yet to yield any substantial results. The authors concede that the majority of India's rural population has not benefited from the growth of the ICT industry and expanding infrastructure, but emphasize the great potential of it to help, given relevant changes in policy.

With unclear benefits to the rural population and very apparent benefits to the urban population (some examples shown in the "ICT Sector Statistics in India - Current Status" 2013 report and Gregory Neil's book, "New Industries from New Places") we can start to assume a growth in the income gap between these two groups. Changes in income are directly related to changes in socioeconomic conditions. We can see these non-fiscal impacts by observing many indicators, such as teledensity (fixed and mobile connections). In "Behind the Scenes of the Telecommunications Miracle," Sara Biancini (2010) finds that "the gap between urban and rural teledensity has steadily increased: the benefits of telecommunications growth seem to be mainly captured by wealthier and urban customers." This is a common conclusion found throughout the literature.

With a strong discussion on labor market impacts of ICTs, Ghose (2012) explains that India has excluded the unskilled, labor-intensive industries while focusing on growing the skilled labor force since the 1990s. Carl Dahlman (2007) relates to this pattern, noting how it has caused

a trend toward increasing the income gap between the skilled, educated workforce and the unskilled, uneducated force. Neil Gregory's book (2009) helps pinpoint one of the main reasons why the skilled are benefitting so much more than the unskilled.

New Industries from New Places (Gregory, Nollen, and Tenev 2009), provides a comprehensive description, explanation, and comparison of China and India's software and hardware industries. One key piece of information the authors share in this book is that China employs more unskilled workers in its tech industry than India does. The reason is because China focuses more heavily on hardware production (which can employ more unskilled workers for manufacturing) while India puts more emphasis on software production (which requires more skilled workers than unskilled). The end product of India's industry simply demands more highly educated human capital as a factor of production. Thus, given the abundant availability of unskilled, uneducated workers in India, there is a large surplus who must compete in a market with decreasing demand for such workers.

Approaching this topic from another vantage point, Carol Upadhya's study in Banagalore illustrates the social profile of IT workers. Upadhya's (2007) findings were that IT workers are largely characterized as urban, middle class, and high or middle caste. In her paper, Upadhya's objective was to find *who* is employed by this thriving industry. According to her study, "it is primarily the middle class that possesses not only the economic means but the social and cultural capital necessary to equip their children to enter this profession." Software companies typically recruit engineering graduates, thus to get the job one must have already been endowed with a certain amount of social and financial prestige. 86 per cent of Upadhya's study respondents came from upper dominant caste groups. Because of evidence that urban, upper castes are typically the

type hired by software companies, Upadhya concludes that the IT profession has yet to benefit the poor and people from lower castes in rural areas socially or economically.

As noted earlier, Eichengreen and Gupta (2011) also agree the ICT industry uses little unskilled and semi-skilled labor and the economy will have to shift labor into both manufacturing and services. Doing so would hopefully help lessen the socioeconomic gap between the skilled and unskilled. Despite this, they advocate the ICT industry's growth in arguing that "the mobile phone has emerged as an important development tool." They conclude the spread of this device "has the potential to break the rural-urban developmental gap by delivering information on a variety of economic and social issues." Tiwari (2008) also recognizes this potential claiming that ICTs provide better access for rural people to e-commerce, e-education, and other services. However, much of this benefit is just seen as *potential.*

In "ICT and Rural Societies: Opportunities for Growth", Mathur and Ambani (2005) present cases in which ICTs were used effectively to benefit rural societies. However, in India specifically, they emphasizes *potential future* gains by ICT growth, but none currently seen. Mathur and Ambani say the very high potential benefits will be reaped by rural India with "a combination of regulations and government incentives and support for private initiatives." So rural India must overcome social and political barriers to capture the gains of its country's ICT industry.

There is a lot of consensus in the literature of the potential for this industry to be more inclusive and its benefits to cross social barriers. Evidence of this potential lies in current efforts to accomplish this difficult task. Mathur and Ambani (2005) and Tiwari (2008) discuss the Gyandoot project which was launched on November 29th, 1999 to take ICT into rural areas of

India. This project has been largely successful in providing services in rural populations' native languages, overcoming the language barrier and aiding rural citizens in reducing transaction and transportation costs (Tiwari, 450). Mathur and Ambani also cite technologies specifically created for rural users at a lower cost and softwares made for use in local languages.

The efforts are apparent. Crucial next steps will be to evaluate these projects over the upcoming years and analyzing their success in establishing a more inclusive economy. However, we can already see these efforts will require more than just placement into rural areas. The Gyandoot study found that villagers aren't utilizing the kiosks for some of their most beneficial services such as their provision of advice on agricultural practices and health issues. In addition, many rural peoples aren't using the kiosks at all because they prefer face-to-face consultation and advice (Tiwari, 455). Tiwari (2008) explains that the usage rate of these kiosks are much lower than the awareness rate; "those with higher levels of literacy and income are accessing the Gyandoot services more than those with lower literacy and incomes" (p. 454). It seems although the people are aware of these services, and more and more have them available, they are not aware of the great benefit the services can provide, socially and economically. Heeks and Arun's study of women's social enterprises in Kerala (2010) also found that rural inhabitants with slightly more education and/or fiscal endowments make better use of the service opportunities introduced to them. The underlying issue in this disuse is the villagers must first be educated before ICT can become a successful implementation.

From the bigger picture, India's ICT sector growth has not benefited rural India. There are many potential benefits, but the findings are in the past two decades, the socioeconomic growth has been exclusive to the middle and upper classes.

Section 2

I. Background and Methodology

As discussed earlier, the available ICT data are dramatically lacking in substance and usefulness. Efforts to collect such specific data have only just begun. As a result, I had to be creative in my attempts to analyze this sector's influence on India.

I was able to find sufficient historical data on India's national accounts, both country-wide and on a state level. Through careful reading, I determined that ICT industry output is measured within the category of, "Real Estate, Ownership of Dwellings, Business Services and Legal Services" within India's national accounts definitions found on page 56 of the "National Accounts stats – sources and methods" (Central Statistics Office 2012). Under Computer and Related Activities in Private Sector, subcategorized under Real Estate, Ownership of Dwellings, Business Services and Legal Services, it is defined: "The activities covered under this compilation category are hardware consultancy, software consultancy and supply, data processing, database activities, maintenance and repair of office/accounting/computing machinery and other computer related activities" (pg57 section 6.1.54). Additionally, on page 171 section 19.16, it is stated "GVA estimates for organized sector are prepared using NASSCOM data of output of software services and GVA to output ratio obtained from the analysis of available annual reports of software companies…" These portions of the Indian national accounts report ICT output.

The telecommunications piece of ICT can be found within the "Communication" subcategory of "Transport, Storage and Communication." As defined in the national accounts on

page 161, section 17.30, “The activities covered under this compilation category under private sector… covers the activities of cellular & basic telecom services…”

To measure ICT’s contribution to GDP on a country and state level, I combine the larger category of “Real Estate, Ownership of Dwellings, Business Services and Legal Services” with the subcategory “Communication” of the category “Transport, Storage, and Communication.” Any measurements in my data analysis of ICT contribution to GDP and SDP (state domestic product) output and growth rate are derived from this sum.

The remainder of my numerical resources came from the following online databases: data.gov.in, NASSCOM, the Planning Commission of the Government of India, the Ministry of Statistics and Programme Implementation (MOSPI), The World Bank, GapMinder.org, and other miscellaneous sources. The statistical data I attempted to gather pertained to state-wise financial, health, employment, technological, and educational statuses of rural households. It was simple to find country wide statistics on these indices, but with very few time series; when, to do the required analysis, I required state-wise multiple time-series data – a rare finding. I also sought out data broken down by rural and urban areas in order to differentiate the impacts of ICT.

I used my text/qualitative sources mainly to provide background into this topic, India’s ICT sector and its place in the world. This type of information was useful for providing case study comparisons to other countries or states which have undergone a transition to ICT enabled services and what the anecdotal outcomes were. Texts provided necessary descriptions of what characterizes the ICT sector, thenceforth what aspects of the sector I should look further into for numerical and statistical data.

I gathered the literature sources from several online databases, access to which is provided by the Portland State University library (EconLit, NBER, OECD iLibrary, World

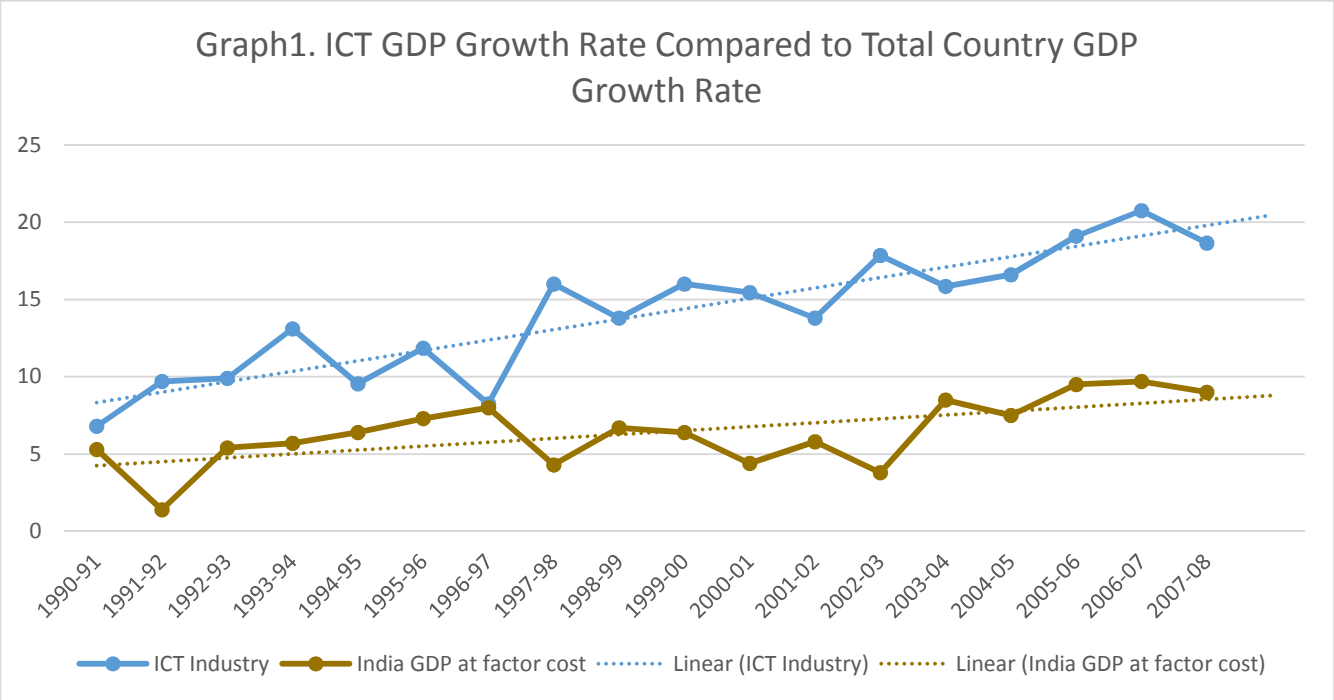
Databank, LexisNexis). Google Scholar was also used. I initially chose my resources by reading their abstracts and/or introductions. I chose articles based off of their relevance to my hypothesis (either by supporting or negating it) then extracted the main arguments, findings, conclusions, etc. These literature sources were mainly used to inform the literature review, providing analyses of the ICT industry in India and other countries and case studies from Indian towns and villages.

Using the statistical data I gathered, I attempt to provide objective conclusions of the impact ICT has on the socioeconomic statuses of the rural population. I expect my quantitative findings will tell that the largest contributor to India's economy is its ICT sector and it is only growing as such; meaning India is increasing specialization into this industry.

Section 3

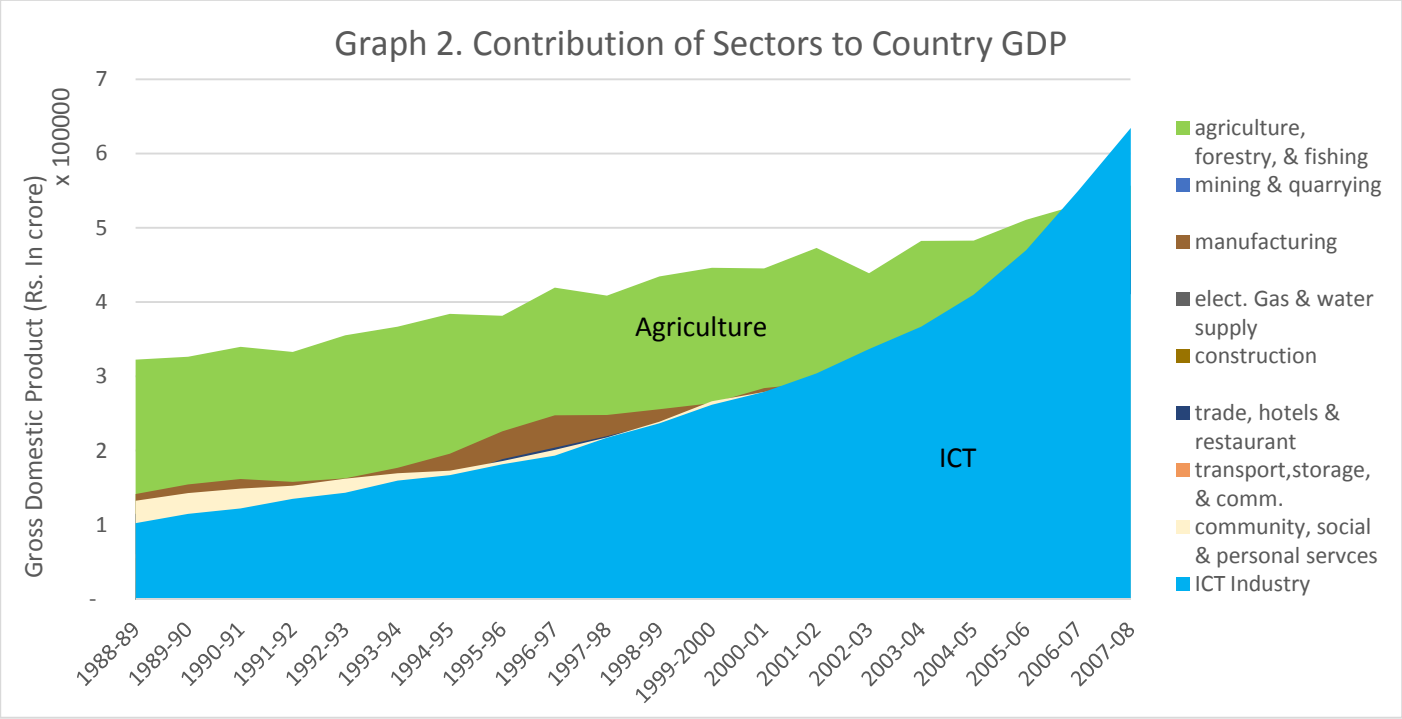
I. The Data

As discussed, in order to extract ICT output data, I had to be creative in sorting out the national accounts and concluded that ICT economic contributions can be measured through the sum of "Real Estate, Ownership of Dwellings, Business Services and Legal Services" and the subcategory "Communication." Graph 1 depicts the GDP (gross domestic product) growth rates of all India compared to that of the ICT sector alone from 1990 to 2008. Both objects' rates increase over time, indicating positive growth, but ICT's growth surpasses the country's total average growth and is much more aggressive, illustrated by the steeper slope of the ICT industry line. This steeper, increasing rate indicates a very robust growth, especially compared to the country as a whole.



Graph1. Source: Author's analysis based on data from *data.gov.in*

As a part of all sectors of the Indian economy, Graph 2 shows ICT gaining the lead over agriculture in about 2006, and increasing thereafter at a very steep rate, also depicted in Graph 1. Illustrated here, the ICT sector has accumulated sectorial dominance within the economy in both growth rate and as a part of total GDP.



Graph2. Source: Author's analysis based on data from *data.gov.in*

The ICT sector clearly holds weight in monetary terms, but the question posed here is, how is it impacting the lives of rural Indians? Particularly, the impoverished who cannot directly benefit from this sector.

India's 28 states differ drastically from one another – some are homes to ICT hubs, emulating the U.S.'s Silicon Valley while others have barely been introduced to the sector. To answer my question, I sought out time-wise, state-wise data from the early 1990s to present so I may analyze ICT's impact, accounting for the start of the ICT boom and the differences between states. In my data gathering, I was able to obtain the following indices for half of India's states:

Assam, Bihar, Goa, Gujarat, Haryana, Jammu & Kashmir, Kerala, Madhya Pradesh, Maharastra, Manipur, Nagaland, Punjab, Tamil Nadu, and Uttar Pradesh:

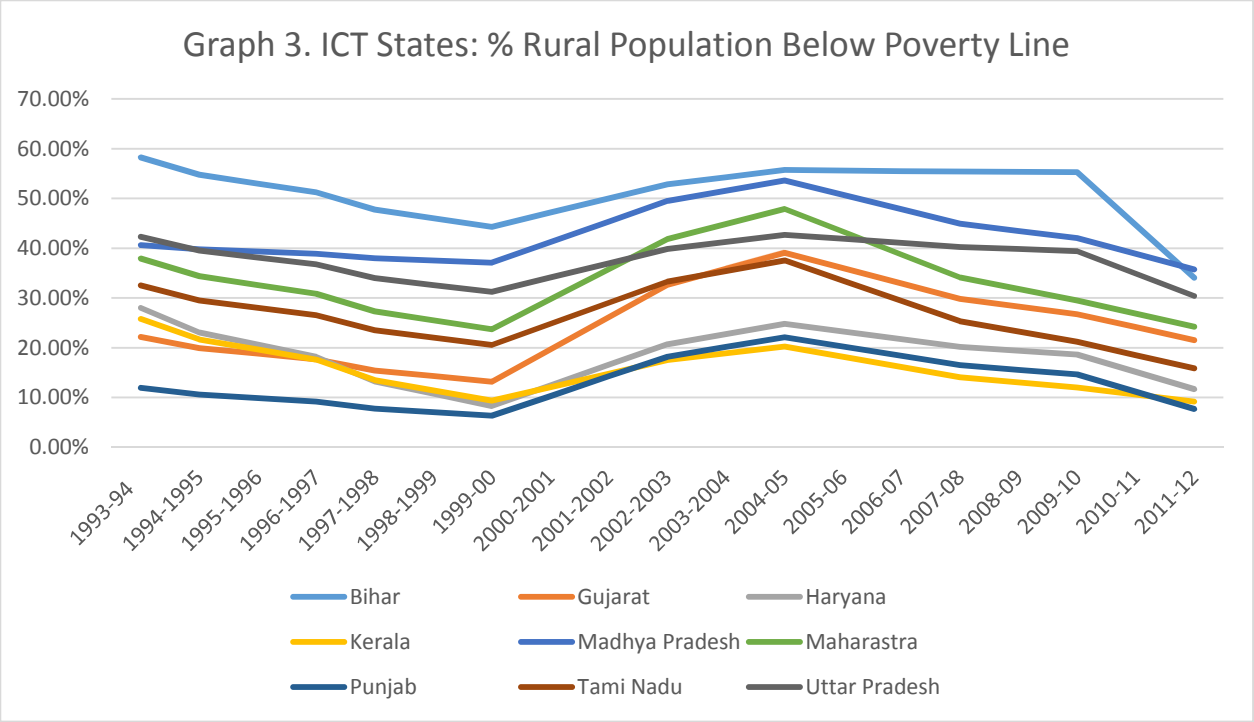
- **State-wise national accounts, including crore level state domestic product (SDP) contribution and growth rate sectorial breakdowns (1993 – 2012)** ("Data.gov.in"). I use this information to derive ICT industry SDP and compare other sectors.
- **State-wise percentage of rural and urban populations below the Indian poverty line (1993 – 2012)** (Planning Commission Government of India 2014). This data is used as a proxy to measure the impact of ICT on the rural poor.
- **State-wise rural and urban populations (2001 and 2011)** (Health Education to Villages 2011). This source provided only two time periods, coinciding with the dates the Indian census took place, so in order for this information to be useful in my analysis, I took the average yearly growth rate between 2001 and 2011 to estimate the rural and urban population movements from 1993 – 2000 and 2001 – 2010. This data was used to calculate ICT per capita and the percentage of state-wise rural and urban populations. Using ICT per capita as opposed to the state-wide ICT level served as a more accurate measure to analyzing the impact of ICT on individuals. And including the percentage of state-wise rural and urban populations helps in accounting for migrations.

In order to find the actual impacts of ICT, I determined which Indian states had active ICT sectors and which didn't. Sumontro Mitro (2006) provides a map of India pinpointing key "Information Technologies Geographics." Using this as a proxy to determining ICT states, I found all but one of the states (of those I was able to gather national accounts for) he pinpointed had ICT sectors contributing over one-million crore to SDP; all other states' ICT shared a

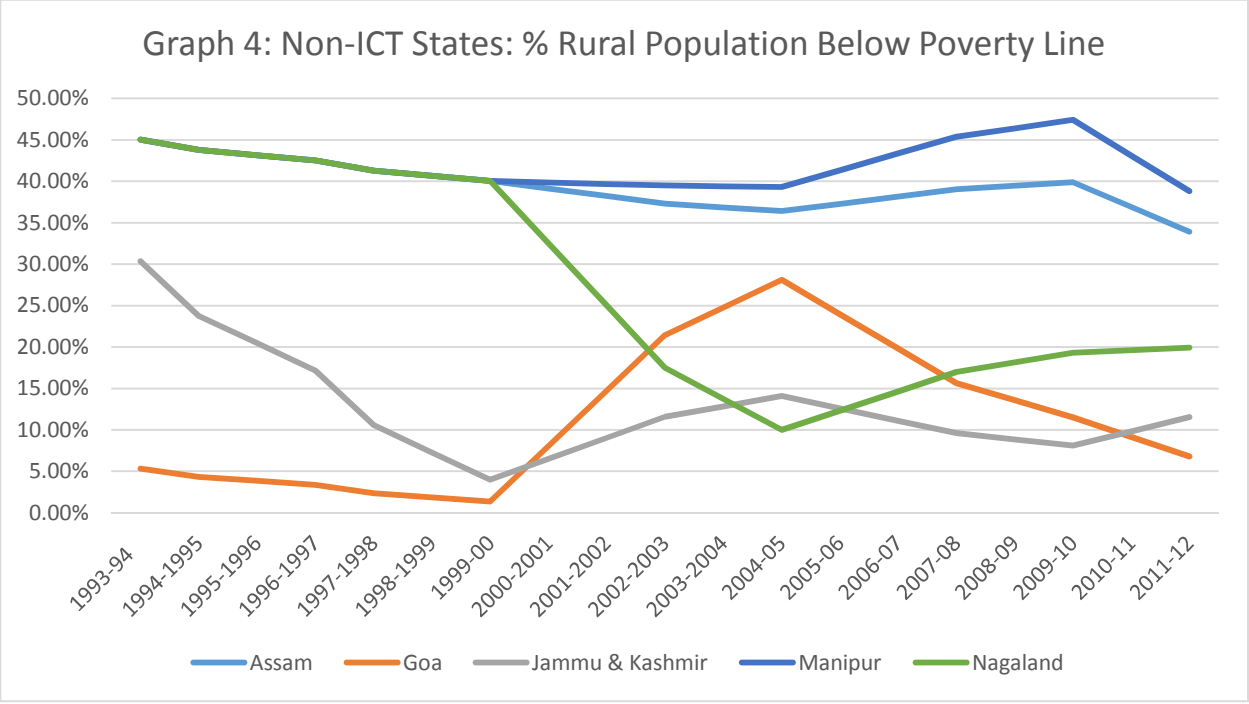
substantially lower portion of SDP. I categorized all states with ICT sectors adding one-million crore or more as "ICT states;" these include Bihar, Gujarat, Haryana, Kerala, Madhya Pradesh, Maharastra, Punjab, Tami Nadu, and Uttar Pradesh. And those with less than one-million ICT SDP as, "non-ICT states;" these include Assam, Goa, Jammu & Kashmir, Manipur, and Nagaland.

All of the ICT states share an obvious pattern, illustrated in Graph 3: from 1993 to 2000, the percent rural population below the poverty line in all ICT states decreased from 1993 to 1999, increased from 2000 and peaked at 2004, then generally decreased from 2005 to 2012 with a slight upward peak in 2009-2010. The 2004-2005 and 2009-2010 peaks in rural poverty occurred during "the period of states reforming the delivery of public services notably the Public Distribution System (PDS) for delivery of subsidized food grain... this period is also characterized by very high inflation, particularly in food which coincided with the worst droughts in India's independent history" (Himanshu 2012). It's important to note here that poverty patterns (among all other indices) are influenced by many different factors. But it's an interesting finding that only the ICT states exhibited this very obvious ebb and flow in their rural poverty populations.

Graph 4 depicts the percent of non-ICT states' rural populations below the poverty line from 1993 to 2012. None of these states share a visible pattern – this illustration differs drastically from the uniform pattern which all of the ICT states follow. This suggests that ICT states' economies (thus the welfare of their people) are, by some significant measure, impacted by their ICT sectors, but there is not enough data to prove that at this stage.



Graph 3. Source: Author's analysis based on data from the *Planning Commission Government of India*



Graph 4. Source: Author's analysis based on data from the *Planning Commission Government of India*

II. Statistical Analysis

Regression Expectations

The question at hand asks how India's ICT sector has impacted the rural poor (measured by poverty ratios). To answer this, a correlation between ICT and rural poverty must first be established, to show that ICT actually impacts poverty. I attempt to do this by applying a time-series and cross-sectional regression analysis of a few relevant and available variables: the dependent variable, state-wise rural poverty percentages (abbreviated as RPOV); and the independent variables, ICT SDP per capita (ICT), agriculture SDP level (AGR), manufacturing SDP level (MAN), percent state population living in rural areas (PCRPOP), percent state population living in urban areas (PCUPOP), and a dummy variable indicating whether or not a state is an "ICT state" (ICTS). This analysis will be done on the 14 states for which I have national accounts from 1993 through 2011. The time series includes the start of Indian reforms and economic boom and gets as close to present time as I was able to gather data for.

In the regression analysis, I expect that increased agricultural and manufacturing SDP would decrease rural poverty, given they can and do typically function within the unorganized sector – thus, more output and jobs in these sectors would positively influence the socioeconomic status of the rural poor. I also expect increases in ICT per capita would decrease poverty, because this implies a greater spread/availability of ICT to all citizens (hence, per capita), thus the socioeconomic benefits are more equally spread per person. On the other hand, I expect that rural poverty will be higher in ICT states than in non-ICT states. This may seem conflicting to my expectation for ICT per capita – but the difference between these two variables is that being an ICT-state (one whose ICT SDP is greater than $1 million crore) implies greater specialization in ICT and neglect of other sectors – sectors which the impoverished are capable

of participating in. The PCRPOP and PCUPOP variables are included to account for rural and urban state migrations over time.

Variable	Expected Sign	Acronym	Definition
Dependent	n/a	**RPOV**	**The percent of rural population below the poverty line**
Independent	(-)	AGR	Agriculture sector SDP level
Independent	(-)	MAN	Manufacturing sector SDP level
Independent	(-)	ICT	ICT SDP per capita
Independent	(+)	ICTS	1 = is an "ICT state"; 0 = is not an "ICT state"

As mentioned earlier, my analyses are limited due to the lack of data availability in this subject matter; therefore I expect the general significance of the regression analysis to be low (as measured by the adjusted R-squared statistic) because I will not be able to include many relevant variables that impact rural poverty. Another caveat to this analysis is the 2004-2005 rural poverty spike which was certainly unrelated to ICT. So the regression results are not biased by this, I separated the data into two regressions, one of the pre-spike period, 1993-2003, and one post, 2004-2011.

Regression Results

As expected, the R-squared values for both regressions are not substantially significant – .3911 for the 1993-2003 regression, and .4917 for 2004-2011 – this is certainly due to the lack of relevant variables, but it's not cause for throwing out the data. The findings are still informative.

The regression of the pre-2004-2005 poverty spike yielded insignificant correlations between rural poverty and independent variables, except for manufacturing. Although manufacturing shows a very significant correlation to rural poverty, its unexpected positive sign implies that increased MAN increases RPOV, against my expectations that it would instead decrease RPOV.

However, it is theoretically plausible that an increase in MAN would increase RPOV, given the additional jobs and output by MAN does not benefit the impoverished, but instead benefits slightly or substantially more advantaged populations.

The regression of the post-2004-2005 poverty spike also displays a positive, significant MAN correlation to RPOV – the possible alternate theory can apply to this situation as well. Other than the sign of MAN, every other variable shows a significant correlation to RPOV and have the expected signs. These correlations increase confidence in my theories that increases in the agricultural sector and ICT per capita decrease RPOV – and being an ICT state increases RPOV.

Regression: 1993-2003

Dependent Variable: LOG(RPOV)
Sample: 1993 2003
Periods included: 11
Cross-sections included: 14
Total panel (balanced) observations: 154

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.689673	0.337226	-5.010513	0.0000
AGR	-1.18E-08	9.32E-08	-0.127129	0.8990
MAN	2.83E-07	6.80E-08	4.166387	0.0001
ICT	-6.049282	6.361740	-0.950885	0.3432
PCRPOP	1.186782	0.368247	3.222791	0.0016
PCUPOP	-3.044498	0.590724	-5.153844	0.0000
ICTS	-0.008161	0.146532	-0.055695	0.9557

R-squared	0.391107	Mean dependent var	-1.456015
Adjusted R-squared	0.366254	S.D. dependent var	0.729405
S.E. of regression	0.580666	Akaike info criterion	1.795107
Sum squared resid	49.56445	Schwarz criterion	1.933151
Log likelihood	-131.2233	Hannan-Quinn criter.	1.851180
F-statistic	15.73696	Durbin-Watson stat	0.291009
Prob(F-statistic)	0.000000		

Regression: 2004-2011

Dependent Variable: LOG(RPOV)
Sample: 2004 2011
Periods included: 8
Cross-sections included: 14
Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.751170	0.311750	-5.617229	0.0000
AGR	-4.05E-08	1.89E-08	-2.145921	0.0342
MAN	6.67E-08	1.41E-08	4.719115	0.0000
ICT	-7.961501	1.417897	-5.615005	0.0000
PCRPOP	0.954343	0.345844	2.759461	0.0068
PCUPOP	-0.145364	0.439718	-0.330584	0.7416
ICTS	0.168485	0.109080	1.544599	0.1255

R-squared	0.491690	Mean dependent var	-1.395999
Adjusted R-squared	0.462643	S.D. dependent var	0.554061
S.E. of regression	0.406153	Akaike info criterion	1.096285
Sum squared resid	17.32079	Schwarz criterion	1.266192
Log likelihood	-54.39199	Hannan-Quinn criter.	1.165222
F-statistic	16.92778	Durbin-Watson stat	0.382167
Prob(F-statistic)	0.000000		

The negative sign on the ICT per capita coefficient could also be speaking to the potential benefits of ICT on the impoverished, as discussed in the literature. There are substantial potential gains from the use of ICT, given the population is learned and capable of using it. Again, the underlying issue is that impoverished villagers in rural areas do not yet conceive of the

socioeconomic benefits ICT can bring them – so they must first be taught. Then, the statistical relationships seen in the regression done here could come to greater significance and life.

Section 4

I. Conclusion

There is strong potential for ICT to advance the socioeconomic wellbeing of India's rural poor but this potential has yet to be tapped into, as shown in multiple case studies. The success of ICT in rural areas will require many changes to the current landscape (e.g. increased availability of education, training, infrastructure, and affordable ICT capital). The regression analysis shows that ICT can help decrease rural poverty, given it is better dispersed among the populations. However, without the dispersion, an ICT state can be harmful to its impoverished as its economy shifts focus away from the primary sector, causing primary sector job availability and labor demand to decrease.

ICT over the past two decades has more than likely indirectly, negatively impacted the rural poor by slowing the growth of the primary sector through ICT specialization. However, the pertinent question now becomes, how *will* ICT impact the rural poor?

If India can find effective methods to integrating ICT into rural areas, this sector could prove tremendously beneficial to decreasing poverty. But if India continues on its current path of slow primary sector growth and rapid modern sector growth, ICT will only worsen the socioeconomic gap between the lower and middle-upper classes.

Either direction is plausible, but to more accurately understand the impact of ICT, more data is needed. The conclusions I've made through regression analysis are correlationally

significant but are lacking in well-roundedness. Relevant variables were unavoidably left out due to the young nature of this research. To better understand poverty, I would've liked to include state-wise, time-series data on employment, unemployment, underemployment, wage rates, access to education, type of job availability, and rural proximity to urban areas. To then draw stronger relationships to ICT and fully understand the ICT landscape, I would've liked data on the number of ICT companies per state, their individual outputs, concentration, dispersion, proximity to rural areas, number of employees, the wage rates of ICT employees by state, and more. As the Indian government continues to advance its data collection span and accuracy, stronger conclusions can be made. Until then, researchers must make do.

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